

# PATENT ABSTRACTS OF JAPAN

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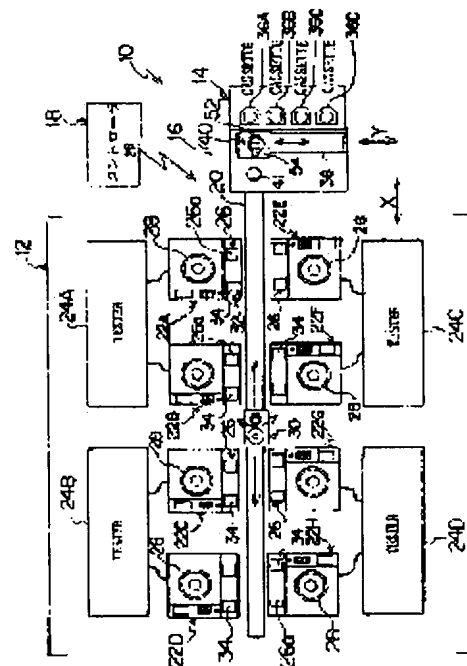
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## (54) WAFER INSPECTING APPARATUS

### (57)Abstract:

**PURPOSE:** To provide a wafer inspecting apparatus wherein it shortens the inspection and treatment time, per cassette, of a cassette in which many wafers have been housed.

**CONSTITUTION:** Out of four cassettes 36A to 36D which have been stocked in a cassette stock part 14, wafers under test which have been housed in the cassette 36A are taken out one by one from the cassette 36A by means of a self-propelled vehicle 40 in a wafer conveyance apparatus 16. The wafers 56 which have been taken out are conveyed respectively to a plurality of wafer probers 22A to 22H by means of a self-propelled vehicle 30. The wafers whose inspection has been finishes by means of the wafer probers 22A to 22H are sequentially conveyed to, and housed, in the original cassette 36A by means of the self-propeller vehicles 30, 40. In addition, wafers under test are taken out from the cassette 16A and conveyed to the wafer probers 22A to 22H. Thereby, the inspection and treatment time, per cassette, of the title inspection apparatus can be shortened.



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**CLAIMS**

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[Claim(s)]

[Claim 1]It is characterized by comprising,

Two or more sets of wafer inspection sections stationed with a predetermined interval.  
Many cassettes by which several many wafers to be examined were stored A cassette stock section in which this stock is possible, A wafer transportation means which take out every one sheet of said wafer stored by predetermined cassette of a cassette stock section from this cassette, and it is conveyed to said two or more wafer inspection sections, respectively, and conveys even the original cassette and stores a wafer which carried out inspection finish in a wafer inspection section to this cassette.

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## DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Industrial Application]This invention relates to the wafer test equipment which inspects the electrical property of the semiconductor device circuit which started wafer test equipment, especially were formed on the semiconductor wafer.

[0002]

[Description of the Prior Art]Many electric element circuits where a semiconductor wafer is the same on the surface are formed.

Before cutting this electric element circuit as each chip, its good and defect are judged for every electric element circuit with the wafer test equipment called a wafer prober that the formation quality of each electric element circuit should be inspected.

[0003]Said wafer test equipment comprises a cassette storage part, a wafer transportation part, a table, a device control part judgment part, etc. The cassette which stored several many wafers to be examined is attached to said cassette storage part.

Every one sheet of this wafer is taken out from a cassette by said wafer transportation part, and it is conveyed to said table.

A table performs horizontal migration of the direction of X-Y which adsorbed the wafer and followed the element array at the time of an element inspection, and vertical movement of a Z direction.

[0004]Said device control part judgment part comprises a probe stage, a circuit tester, etc. The probe card corresponding to a wafer to be examined is attached to the probe stage.

By making each electrode pad of an electric element circuit contact the probe needle provided in this probe card, the inspection judging of the formation quality of each electric element circuit is carried out one by one by said circuit tester.

[0005]Even a cassette is conveyed by the wafer transportation part from a table, and the wafer which carried out inspection finish is stored by the original shelf of a cassette by it.

[0006]

[Problem(s) to be Solved by the Invention]However, in conventional wafer test equipment, since several Oshi's wafer stored to one cassette is processed with one set of wafer test equipment, there is a fault that the inspection time per cassette becomes long. Although two or more sets of wafer test equipment is allocated, and the cassette corresponding to the number of wafer test equipment is stored to a wafer stock section, a wafer is picked out from said cassette with a wafer conveying machine and the wafer test equipment of conveying one by one is one of the wafer test equipment corresponding to the wafer, As this wafer test equipment was also mentioned above, there is a fault that the inspection time per cassette becomes long.

[0007]This invention was made in view of such a situation, and an object of this invention is to provide the wafer test equipment which shortens the inspection processing time per cassette.

[0008]

[Means for Solving the Problem]Two or more sets of wafer inspection sections stationed by this

invention having a predetermined interval in order to attain said purpose. Many cassettes by which several many wafers to be examined were stored A cassette stock section in which this stock is possible, Take out every one sheet of said wafer stored by predetermined cassette of a cassette stock section from this cassette, and convey it to said two or more wafer inspection sections, respectively, and. \*\*\*\*\* is made with the feature a wafer transportation means which conveys even the original cassette and stores a wafer which carried out inspection finish in a wafer inspection section to this cassette.

[0009]

[Function]According to this invention, by a wafer transportation means, it picks out at a time one wafer to be examined first stored by the 1st cassette among two or more cassettes stocked by the cassette stock section from this cassette, and it is conveyed to two or more sets of wafer inspection sections, respectively. Next, it conveys to said wafer inspection section which even the original cassette was conveyed and stored more than one by said wafer transportation means in an order from the wafer which carried out inspection finish in the wafer inspection section of the stand, and also picked out the wafer to be examined from the cassette, and did inspection finish.

[0010]Thereby, the inspection processing time per cassette can be shortened by the number of a wafer inspection section. For example, if eight wafer inspection sections are established, as compared with the conventional wafer test equipment which carries out inspection processing of the one cassette, inspection processing time can be shortened to one eighth in one wafer inspection section. An end of the inspection of all the wafers stored by said 1st cassette will start the inspection of the wafer stored by the 2nd cassette of the cassette stock section. And the 1st cassette is taken out from a cassette stock section, and it exchanges for new KASSETO by which the wafer to be examined was stored. Thus, it exchanges for new KASSETO in an order from the cassette which the inspection of the wafer ended, and sends to a post process one by one.

[0011]

[Example]It explains in full detail about the desirable example of the wafer test equipment applied to this invention according to an accompanying drawing below. The plan showing the example of the wafer test equipment 10 concerning this invention is shown in drawing 1, and this wafer test equipment 10 comprises the wafer inspection section 12, the cassette stock section 14, the wafer conveying machine 16, and the controller part 18.

[0012][Wafer inspection section 12] The wafer inspection section 12 to one side (the direction of figure Nakagami) on both sides of the conveyance rail 20 of the wafer conveying machine 16 Four sets of wafer probes 22A, 22B, 22C, and 22D are intervals predetermined in four sets of the wafer probes 22E, 22F, 22G, and 22H, and counter the other side (the direction of figure Nakashita), and are arranged in parallel again. Four sets of the circuit testers 24A, 24B, 24C, and 24D are connected to the wafer probes 22A thru/or 22H at a rate of two sets at one set.

[0013]Said wafer probe 22A is provided with the 1st wafer transportation part 26 and probe stage 28 grade. The wafer transportation part 26 will be conveyed to the table which was allocated under said probe stage 28 and which is not illustrated, if the wafer conveyed with the traveling carriage 30 which said wafer conveying machine 16 mentions later is received by the feed zone 26a. The table can adsorb said wafer and can perform horizontal migration of the direction of X-Y according to the element array, and vertical movement of a Z direction at the time of an element inspection.

[0014]The probe card corresponding to a wafer to be examined which is not illustrated is attached to the probe stage 28.

By making each electrode pad of said electric element circuit contact the probe needle provided in this probe card, the inspection judging of the formation quality of each electric element circuit is carried out one by one by said circuit tester 24A.

The wafer which carried out inspection finish is conveyed by said 1st wafer transportation part 26 to the feed zone 26a. Said feed zone's 26a conveyance of a wafer will output the signal which shows the end of conveyance to said controller part 18.

[0015]The cassette storage part 32 is formed in the wafer probe 22A. The cassette 34 by which

several many wafers to be examined were stored is attached to this cassette storage part 32. Every one sheet of this wafer is taken out from the cassette 34 by the 2nd [ which was provided in the wafer prober 22A ] wafer transportation part that is not illustrated, and it is conveyed to said table.

[0016]Since the composition of the wafer probers 22B thru/or 22H is the same as the composition of the wafer prober 22A mentioned above, the explanation is omitted.

[Cassette stock section 14] As for the cassette stock section 14, the four cassettes 36A, 36B, 36C, and 36D by which several many wafers to be examined were stored are arranged at the predetermined intervals in the depth direction in a figure. Rise and fall movement is possible for these cassettes 36A thru/or 36D to the depth direction in a figure by the lifting device which was formed in the cassette stock section 14 and which is not illustrated.

[0017]Drive controlling of said lifting device is carried out by the controller part 18 mentioned above.

[Wafer conveying machine 16] The wafer conveying machine 16 has the conveyance rail 20 allocated in the direction of X in a figure, and the conveyance rail 38 allocated in the direction of Y in a figure which intersects perpendicularly to this conveyance rail 20.

The traveling carriage 30 is arranged again at the conveyance rail 20 respectively possible [ traveling transfer ] for the traveling carriage 40 to the conveyance rail 38.

The zipper 41 for relay of the wafer is allocated near the traveling carriage 40.

[0018]Said motor-vehicle stand 30 comprises the main part 42 of a under carriage, and the robot part 44, as shown in drawing 2. The main part 42 of a under carriage is attached to the conveyance rail 20 movable.

By rotating the wheel connected with the drive motor which was installed by the main part 42 of a under carriage, and in which a right inversion is possible, traveling transfer can be carried out along with the conveyance rail 20.

On the other hand, said robot part 44 comprises the chucking transferring part 46 and the adsorption part 48. The chucking transferring part 46 has the drive motor 50 which adhered on said main part 42 of a under carriage, and the transfer jig 52 is connected with this drive motor 50. The transfer jig 52 can be reversed 180 degrees, moving in the figure Nakaya seal direction, when the drive motor 52 drives. The wafer chucking arm 54 adheres to said transfer jig 52. The wafer chucking arm 54 can hold the wafer 56, and can lay it on the delivery zipper 58 of said adsorption part 48.

[0019]It delivers at the same time it is laid, and the zipper 58 is adsorbed, and the wafer 56 laid in said delivery zipper 58 descends, is stabilized in the tray 60 and held. Since the composition of said motor-vehicle stand 40 comprises the main part 42 of a under carriage mentioned above, and the chucking transferring part 46, the explanation is omitted. The rise and fall movement of the running direction of said motor-vehicle stands 30 and 40, mileage, the drive motor 50, and the delivery zipper 58 is controlled by said controller part 18.

[0020]Next, the control method by the controller part 18 of the constituted wafer test equipment 10 is explained like the above. First, the motor-vehicle stand 40 is moved to the position shown in drawing 1. Next, the robot part 44 of the motor-vehicle stand 40 and the lifting device of the cassette 36A are controlled, It picks out at a time the one wafer 56 to be examined stored by the cassette 36A from the cassette 36A by the wafer chucking arm 54, 180 degrees of transfer jigs 52 are rotated, and it lays in the zipper 41 for relay.

[0021]Next, the motor-vehicle stand 30 is moved to the drawing 1 Nakamigi end. And the robot part 44 and the adsorption part 48 of the motor-vehicle stand 30 are controlled, The wafer 56 laid in said zipper 41 for relay is held by the wafer chucking arm 54 of the motor-vehicle stand 30, 180 degrees of transfer jigs 52 are rotated, and it delivers, and it lays in the zipper 58, and delivers, and adsorbs by the zipper 58, the delivery zipper 58 is dropped, and it holds to the tray 60.

[0022]Subsequently, it is made to run leftward in drawing 1 the motor-vehicle stand 30, and is made to stop in the position of the wafer transportation part 26 of the wafer prober 22A. And after raising the delivery zipper 58, and making the wafer 56 secede from the tray 60 and holding this wafer 56 by the wafer chucking arm 54, clockwise direction is made to rotate 90 degrees of

transfer jigs 52, and it lays in the feed zone 26a of the wafer transportation part 26. The wafer 56 laid in the feed zone 26a is conveyed and inspected to a table by the wafer transportation part 26.

[0023] Thus, also about the remaining wafer probers 22B thru/or 22H, the wafer 56 of the cassette 36A and 56 — are conveyed, respectively, and an inspection is started by each wafer probers 22B thru/or 22H. Next, if the wafer 56 which carried out inspection finish among said wafer probers 22A thru/or 22H is conveyed to the feed zone 26a of the wafer probers 22A thru/or 22H, in an order from the wafer 56 which carried out inspection finish, by said wafer conveying machine 16, even the cassette 36A will be conveyed and it will be stored. Since the wafer storage procedure by the wafer conveying machine 16 is a reverse process of the wafer conveyance procedure mentioned above, the explanation is omitted.

[0024] And after repeating conveyance and storage of the wafer 56, the inspection of all the wafers 56 of the cassette 36A and the wafer 56 of 56 — stored by the cassette 36B after the inspection was completed is started. And the cassette 36A is taken out from the cassette stock section 14, and it exchanges for new KASSETO by which the wafer to be examined was stored. Thus, it exchanges for new KASSETO in an order from the cassette which the inspection of the wafer ended, and sends to a post process one by one.

[0025] Thereby, in this example, the inspection processing time per cassette can be shortened by the number of a wafer inspection section. For example, like this example, if the eight wafer probers 22A thru/or 22H are installed, as compared with the conventional wafer test equipment which carries out inspection processing of the one cassette, inspection processing time can be shortened to one eighth by one wafer prober.

[0026] Although this example explained the inspection processing of the wafer 56 of one variety, What is necessary is not to be restricted to this, either, and just to set up divide the wafer probers 22A thru/or 22H into every circuit tester 24A thru/or 24D, and correspond to the variety of a wafer, when the wafer in which variety differs in every cassette 36A thru/or 36D is stored. What is necessary is to pick out a wafer from the cassette 34 with which each wafer probers 22A thru/or 22H were equipped, and just to make it inspect after the inspection finish of the wafer 56, when it takes time that the new wafer 56 is conveyed from the wafer conveying machine 16. Thereby, inspection processing of a wafer can be performed efficiently.

[0027] A wafer chucking arm is provided in each wafer probers 22A thru/or 22H, and it may be made to transport the wafer 56 which is delivered by this wafer chucking arm and by which the zipper 58 was adsorbed to the wafer probers 22A thru/or 22H.

[0028]

[Effect of the Invention] The inside of two or more cassettes which were stocked by the cassette stock section according to the wafer test equipment applied to this invention as explained above, By the wafer transportation means, picked out at a time one wafer to be examined stored by the predetermined cassette from this cassette, and it was conveyed to two or more sets of wafer inspection sections, respectively, and even the original cassette is conveyed in an order from the wafer which carried out inspection finish, and it was made to store at two or more sets of wafer inspection sections. Thereby, as compared with the conventional wafer test equipment which carries out inspection processing of the one cassette, the inspection processing time per cassette can be shortened substantially in one wafer inspection section.

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TECHNICAL FIELD

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[Industrial Application]This invention relates to the wafer test equipment which inspects the electrical property of the semiconductor device circuit which started wafer test equipment, especially were formed on the semiconductor wafer.

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PRIOR ART

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[Description of the Prior Art]Many electric element circuits where a semiconductor wafer is the same on the surface are formed.

Before cutting this electric element circuit as each chip, its good and defect are judged for every electric element circuit with the wafer test equipment called a wafer prober that the formation quality of each electric element circuit should be inspected.

[0003]Said wafer test equipment comprises a cassette storage part, a wafer transportation part, a table, a device control part judgment part, etc. The cassette which stored several many wafers to be examined is attached to said cassette storage part.

Every one sheet of this wafer is taken out from a cassette by said wafer transportation part, and it is conveyed to said table.

A table performs horizontal migration of the direction of X-Y which adsorbed the wafer and followed the element array at the time of an element inspection, and vertical movement of a Z direction.

[0004]Said device control part judgment part comprises a probe stage, a circuit tester, etc. The probe card corresponding to a wafer to be examined is attached to the probe stage.

By making each electrode pad of an electric element circuit contact the probe needle provided in this probe card, the inspection judging of the formation quality of each electric element circuit is carried out one by one by said circuit tester.

[0005]Even a cassette is conveyed by the wafer transportation part from a table, and the wafer which carried out inspection finish is stored by the original shelf of a cassette by it.

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EFFECT OF THE INVENTION

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[Effect of the Invention]The inside of two or more cassettes which were stocked by the cassette stock section according to the wafer test equipment applied to this invention as explained above, By the wafer transportation means, picked out at a time one wafer to be examined stored by the predetermined cassette from this cassette, and it was conveyed to two or more sets of wafer inspection sections, respectively, and even the original cassette is conveyed in an order from the wafer which carried out inspection finish, and it was made to store at two or more sets of wafer inspection sections. Thereby, as compared with the conventional wafer test equipment which carries out inspection processing of the one cassette, the inspection processing time per cassette can be shortened substantially in one wafer inspection section.

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TECHNICAL PROBLEM

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[Problem(s) to be Solved by the Invention]However, in conventional wafer test equipment, since several Oshi's wafer stored to one cassette is processed with one set of wafer test equipment, there is a fault that the inspection time per cassette becomes long. Although two or more sets of wafer test equipment is allocated, and the cassette corresponding to the number of wafer test equipment is stored to a wafer stock section, a wafer is picked out from said cassette with a wafer conveying machine and the wafer test equipment of conveying one by one is one of the wafer test equipment corresponding to the wafer, As this wafer test equipment was also mentioned above, there is a fault that the inspection time per cassette becomes long. [0007]This invention was made in view of such a situation, and an object of this invention is to provide the wafer test equipment which shortens the inspection processing time per cassette.

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MEANS

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[Means for Solving the Problem]Two or more sets of wafer inspection sections stationed by this invention having a predetermined interval in order to attain said purpose. Many cassettes by which several many wafers to be examined were stored A cassette stock section in which this stock is possible, Take out every one sheet of said wafer stored by predetermined cassette of a cassette stock section from this cassette, and convey it to said two or more wafer inspection sections, respectively, and. \*\*\*\*\* is made with the feature a wafer transportation means which conveys even the original cassette and stores a wafer which carried out inspection finish in a wafer inspection section to this cassette.

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OPERATION

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[Function]According to this invention, by a wafer transportation means, it picks out at a time one wafer to be examined first stored by the 1st cassette among two or more cassettes stocked by the cassette stock section from this cassette, and it is conveyed to two or more sets of wafer inspection sections, respectively. Next, it conveys to said wafer inspection section which even the original cassette was conveyed and stored more than one by said wafer transportation means in an order from the wafer which carried out inspection finish in the wafer inspection section of the stand, and also picked out the wafer to be examined from the cassette, and did inspection finish.

[0010]Thereby, the inspection processing time per cassette can be shortened by the number of a wafer inspection section. For example, if eight wafer inspection sections are established, as compared with the conventional wafer test equipment which carries out inspection processing of the one cassette, inspection processing time can be shortened to one eighth in one wafer inspection section. An end of the inspection of all the wafers stored by said 1st cassette will start the inspection of the wafer stored by the 2nd cassette of the cassette stock section. And the 1st cassette is taken out from a cassette stock section, and it exchanges for new KASSETO by which the wafer to be examined was stored. Thus, it exchanges for new KASSETO in an order from the cassette which the inspection of the wafer ended, and sends to a post process one by one.

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EXAMPLE

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[Example]It explains in full detail about the desirable example of the wafer test equipment applied to this invention according to an accompanying drawing below. The plan showing the example of the wafer test equipment 10 concerning this invention is shown in drawing 1, and this wafer test equipment 10 comprises the wafer inspection section 12, the cassette stock section 14, the wafer conveying machine 16, and the controller part 18.

[0012][Wafer inspection section 12] The wafer inspection section 12 to one side (the direction of figure Nakagami) on both sides of the conveyance rail 20 of the wafer conveying machine 16. Four sets of wafer probers 22A, 22B, 22C, and 22D are intervals predetermined in four sets of the wafer probers 22E, 22F, 22G, and 22H, and counter the other side (the direction of figure Nakashita), and are arranged in parallel again. Four sets of the circuit testers 24A, 24B, 24C, and 24D are connected to the wafer probers 22A thru/or 22H at a rate of two sets at one set.

[0013]Said wafer prober 22A is provided with the 1st wafer transportation part 26 and probe stage 28 grade. The wafer transportation part 26 will be conveyed to the table which was allocated under said probe stage 28 and which is not illustrated, if the wafer conveyed with the traveling carriage 30 which said wafer conveying machine 16 mentions later is received by the feed zone 26a. The table can adsorb said wafer and can perform horizontal migration of the direction of X-Y according to the element array, and vertical movement of a Z direction at the time of an element inspection.

[0014]The probe card corresponding to a wafer to be examined which is not illustrated is attached to the probe stage 28.

By making each electrode pad of said electric element circuit contact the probe needle provided in this probe card, the inspection judging of the formation quality of each electric element circuit is carried out one by one by said circuit tester 24A.

The wafer which carried out inspection finish is conveyed by said 1st wafer transportation part 26 to the feed zone 26a. Said feed zone's 26a conveyance of a wafer will output the signal which shows the end of conveyance to said controller part 18.

[0015]The cassette storage part 32 is formed in the wafer prober 22A. The cassette 34 by which several many wafers to be examined were stored is attached to this cassette storage part 32. Every one sheet of this wafer is taken out from the cassette 34 by the 2nd [ which was provided in the wafer prober 22A ] wafer transportation part that is not illustrated, and it is conveyed to said table.

[0016]Since the composition of the wafer probers 22B thru/or 22H is the same as the composition of the wafer prober 22A mentioned above, the explanation is omitted.

[Cassette stock section 14] As for the cassette stock section 14, the four cassettes 36A, 36B, 36C, and 36D by which several many wafers to be examined were stored are arranged at the predetermined intervals in the depth direction in a figure. Rise and fall movement is possible for these cassettes 36A thru/or 36D to the depth direction in a figure by the lifting device which was formed in the cassette stock section 14 and which is not illustrated.

[0017]Drive controlling of said lifting device is carried out by the controller part 18 mentioned above.

[Wafer conveying machine 16] The wafer conveying machine 16 has the conveyance rail 20

allocated in the direction of X in a figure, and the conveyance rail 38 allocated in the direction of Y in a figure which intersects perpendicularly to this conveyance rail 20.

The traveling carriage 30 is arranged again at the conveyance rail 20 respectively possible [ traveling transfer ] for the traveling carriage 40 to the conveyance rail 38.

The zipper 41 for relay of the wafer is allocated near the traveling carriage 40.

[0018] Said motor-vehicle stand 30 comprises the main part 42 of a under carriage, and the robot part 44, as shown in drawing 2. The main part 42 of a under carriage is attached to the conveyance rail 20 movable.

By rotating the wheel connected with the drive motor which was installed by the main part 42 of a under carriage, and in which a right inversion is possible, traveling transfer can be carried out along with the conveyance rail 20.

On the other hand, said robot part 44 comprises the chucking transferring part 46 and the adsorption part 48. The chucking transferring part 46 has the drive motor 50 which adhered on said main part 42 of a under carriage, and the transfer jig 52 is connected with this drive motor 50. The transfer jig 52 can be reversed 180 degrees, moving in the figure Nakaya seal direction, when the drive motor 52 drives. The wafer chucking arm 54 adheres to said transfer jig 52. The wafer chucking arm 54 can hold the wafer 56, and can lay it on the delivery zipper 58 of said adsorption part 48.

[0019] It delivers at the same time it is laid, and the zipper 58 is adsorbed, and the wafer 56 laid in said delivery zipper 58 descends, is stabilized in the tray 60 and held. Since the composition of said motor-vehicle stand 40 comprises the main part 42 of a under carriage mentioned above, and the chucking transferring part 46, the explanation is omitted. The rise and fall movement of the running direction of said motor-vehicle stands 30 and 40, mileage, the drive motor 50, and the delivery zipper 58 is controlled by said controller part 18.

[0020] Next, the control method by the controller part 18 of the constituted wafer test equipment 10 is explained like the above. First, the motor-vehicle stand 40 is moved to the position shown in drawing 1. Next, the robot part 44 of the motor-vehicle stand 40 and the lifting device of the cassette 36A are controlled. It picks out at a time the one wafer 56 to be examined stored by the cassette 36A from the cassette 36A by the wafer chucking arm 54, 180 degrees of transfer jigs 52 are rotated, and it lays in the zipper 41 for relay.

[0021] Next, the motor-vehicle stand 30 is moved to the drawing 1 Nakamigi end. And the robot part 44 and the adsorption part 48 of the motor-vehicle stand 30 are controlled. The wafer 56 laid in said zipper 41 for relay is held by the wafer chucking arm 54 of the motor-vehicle stand 30, 180 degrees of transfer jigs 52 are rotated, and it delivers, and it lays in the zipper 58, and delivers, and adsorbs by the zipper 58, the delivery zipper 58 is dropped, and it holds to the tray 60.

[0022] Subsequently, it is made to run leftward in drawing 1 the motor-vehicle stand 30, and is made to stop in the position of the wafer transportation part 26 of the wafer prober 22A. And after raising the delivery zipper 58, and making the wafer 56 secede from the tray 60 and holding this wafer 56 by the wafer chucking arm 54, clockwise direction is made to rotate 90 degrees of transfer jigs 52, and it lays in the feed zone 26a of the wafer transportation part 26. The wafer 56 laid in the feed zone 26a is conveyed and inspected to a table by the wafer transportation part 26.

[0023] Thus, also about the remaining wafer probers 22B thru/or 22H, the wafer 56 of the cassette 36A and 56 — are conveyed, respectively, and an inspection is started by each wafer probers 22B thru/or 22H. Next, if the wafer 56 which carried out inspection finish among said wafer probers 22A thru/or 22H is conveyed to the feed zone 26a of the wafer probers 22A thru/or 22H, in an order from the wafer 56 which carried out inspection finish, by said wafer conveying machine 16, even the cassette 36A will be conveyed and it will be stored. Since the wafer storage procedure by the wafer conveying machine 16 is a reverse process of the wafer conveyance procedure mentioned above, the explanation is omitted.

[0024] And after repeating conveyance and storage of the wafer 56, the inspection of all the wafers 56 of the cassette 36A and the wafer 56 of 56 — stored by the cassette 36B after the inspection was completed is started. And the cassette 36A is taken out from the cassette stock

section 14, and it exchanges for new KASSETO by which the wafer to be examined was stored. Thus, it exchanges for new KASSETO in an order from the cassette which the inspection of the wafer ended, and sends to a post process one by one.

[0025]Thereby, in this example, the inspection processing time per cassette can be shortened by the number of a wafer inspection section. For example, like this example, if the eight wafer probers 22A thru/or 22H are installed, as compared with the conventional wafer test equipment which carries out inspection processing of the one cassette, inspection processing time can be shortened to one eighth by one wafer prober.

[0026]Although this example explained the inspection processing of the wafer 56 of one variety, What is necessary is not to be restricted to this, either, and just to set up divide the wafer probers 22A thru/or 22H into every circuit tester 24A thru/or 24D, and correspond to the variety of a wafer, when the wafer in which variety differs in every cassette 36A thru/or 36D is stored. What is necessary is to pick out a wafer from the cassette 34 with which each wafer probers 22A thru/or 22H were equipped, and just to make it inspect after the inspection finish of the wafer 56, when it takes time that the new wafer 56 is conveyed from the wafer conveying machine 16. Thereby, inspection processing of a wafer can be performed efficiently.

[0027]A wafer chucking arm is provided in each wafer probers 22A thru/or 22H, and it may be made to transport the wafer 56 which is delivered by this wafer chucking arm and by which the zipper 58 was adsorbed to the wafer probers 22A thru/or 22H.

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[Translation done.]

\* NOTICES \*

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DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]

[Drawing 1]The plan showing the example of the wafer test equipment concerning this invention

[Drawing 2]The front view of the wafer carrying truck applied to the wafer test equipment concerning this invention

[Description of Notations]

10 -- Wafer test equipment

12 -- Wafer inspection section

14 -- Cassette stock section

16 -- Wafer conveying machine

18 -- Controller part

22A, 22B, 22C, 22D, 22E, 22F, 22G, 22H -- Wafer prober

30, 40 -- Traveling carriage

36A, 36B, 36C, 36D -- Cassette

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\* NOTICES \*

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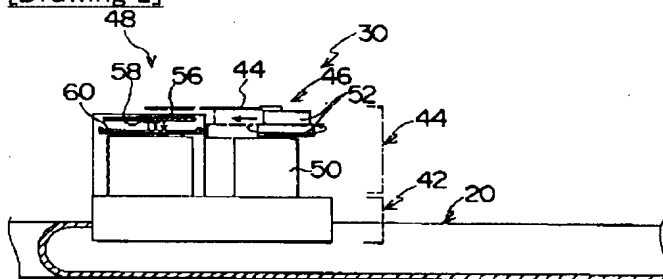
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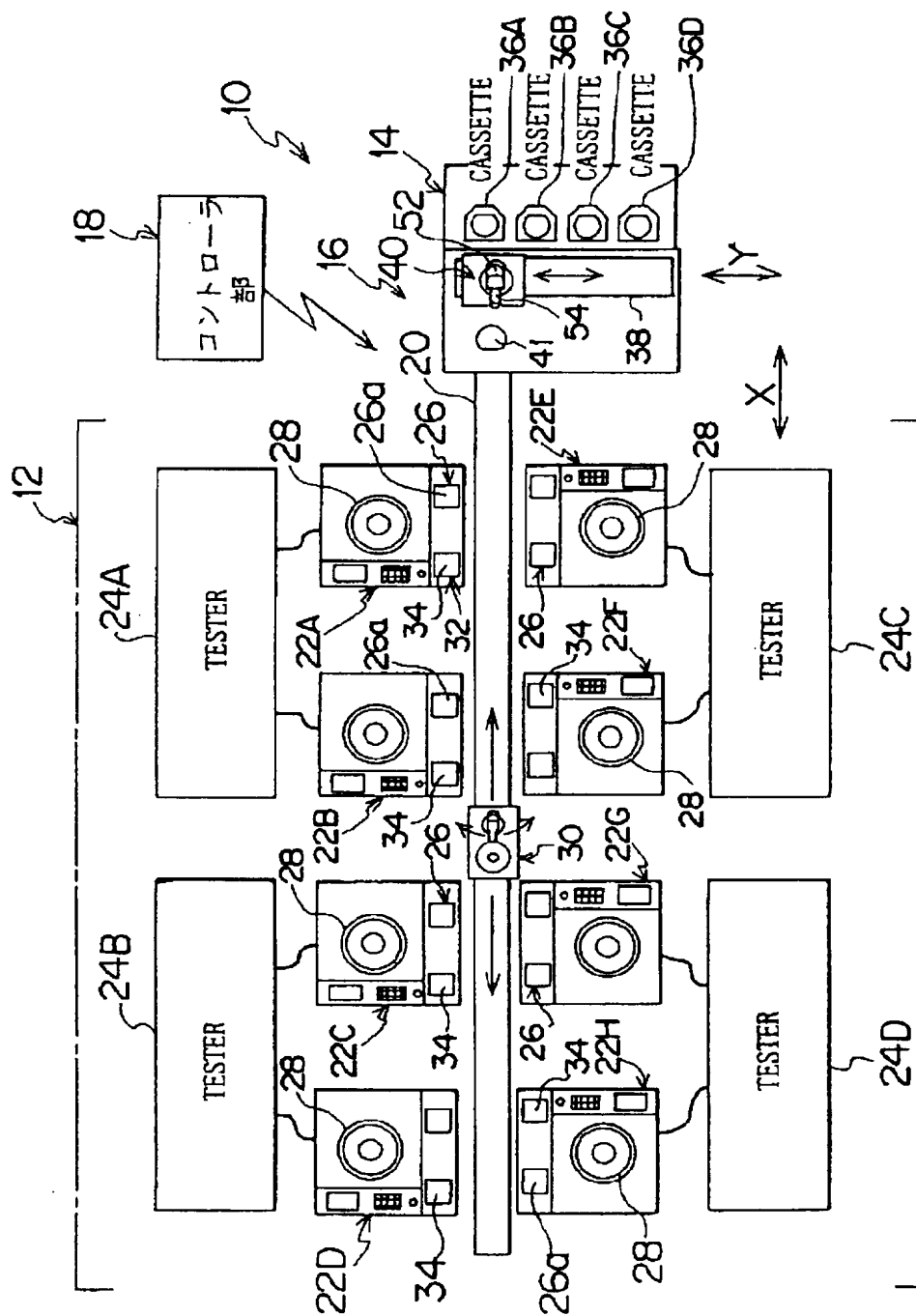
DRAWINGS

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[Drawing 2]



[Drawing 1]



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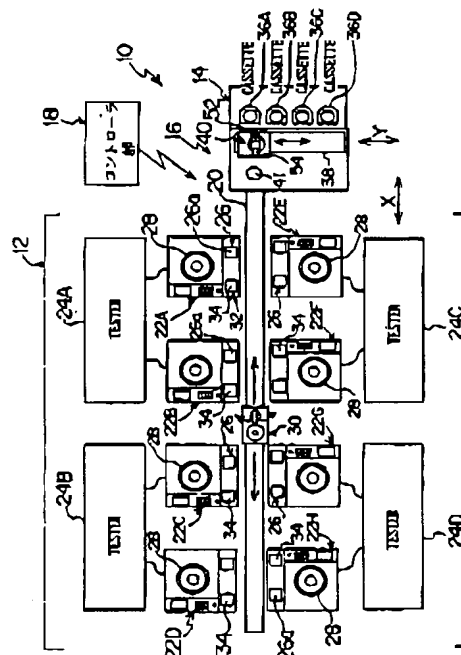
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(54)【発明の名称】 ウエハ検査装置

(57)【要約】

【目的】 多数枚のウエハが収納されたカセットの1カセット当たりの検査処理時間を短縮するウエハ検査装置を提供する。

【構成】 カセットストック部14にストックされた4本のカセット36A乃至36Dのうち、カセット36Aに収納された検査対象ウエハ56を、ウエハ搬送装置16の自走車両40によって該カセット36Aから1枚ずつ取り出し、そして取り出したウエハ56を自走車両30によって複数台のウエハプローバ22A乃至22Hにそれぞれ搬送する。そして、前記ウエハプローバ22A乃至22Hで検査終了したウエハ56から順番に、前記自走車両30、40によって元のカセット36Aまで搬送して収納し、更に検査対象ウエハ56をカセット36Aから取り出してウエハプローバ22A乃至22Hに搬送する。これにより、1カセット当たりの検査処理時間を大幅に短縮できる。



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## 【特許請求の範囲】

【請求項1】 所定の間隔をもって配置された複数台のウエハ検査部と、検査対象のウエハが多数枚収納されたカセットを多数本ストック可能なカセットストック部と、カセットストック部の所定のカセットに収納された前記ウエハを、該カセットから1枚ずつ取り出して複数の前記ウエハ検査部にそれぞれ搬送すると共に、ウエハ検査部で検査終了したウエハを元のカセットまで搬送して該カセットに収納するウエハ搬送手段と、

から成ることを特徴とするウエハ検査装置。

## 【発明の詳細な説明】

【0001】

【産業上の利用分野】 本発明はウエハ検査装置に係り、特に半導体ウエハ上に多数形成された半導体素子回路の電気特性を検査するウエハ検査装置に関する。

【0002】

【従来の技術】 半導体ウエハは、その表面に同一の電気素子回路が多数形成されており、この電気素子回路を各チップとして切断する前に各電気素子回路の形成品質を検査すべく、ウエハプローバと称されるウエハ検査装置で電気素子回路毎にその良・不良が判定される。

【0003】 前記ウエハ検査装置はカセット収納部、ウエハ搬送部、テーブル、及び装置制御部判定部等から構成される。前記カセット収納部には、検査対象のウエハを多数枚収納したカセットが取り付けられており、このウエハは前記ウエハ搬送部によってカセットから1枚ずつ取り出されて前記テーブルまで搬送される。テーブルは、ウエハを吸着して素子検査時にその素子配列に従ったX-Y方向の水平移動と、Z方向の上下移動を行う。

【0004】 前記装置制御部判定部は、プローブステージとテスト等から構成される。プローブステージには、検査対象のウエハに対応したプローブカードが取り付けられており、このプローブカードに設けられたプローブニードルに電気素子回路の各電極パッドを当接させることによって、各電気素子回路の形成品質が前記テストによって順次検査判定される。

【0005】 尚、検査終了したウエハは、ウエハ搬送部によってテーブルからカセットまで搬送されてカセットの元の棚に収納される。

【0006】

【発明が解決しようとする課題】 しかしながら、従来のウエハ検査装置では、1カセットに収納した多数枚のウエハを1台のウエハ検査装置で処理しているので、1カセット当たりの検査時間が長くなるという欠点がある。また、複数台のウエハ検査装置を配設すると共に、ウエハストック部にウエハ検査装置の台数に対応したカセットを収納し、ウエハ搬送装置で前記カセットからウエハを取り出して、そのウエハに対応したウエハ検査装置に順次搬送するというウエハ検査装置があるが、このウエ

ハ検査装置も前述したように、1カセット当たりの検査時間が長くなるという欠点がある。

【0007】 本発明はこのような事情に鑑みてなされたもので、1カセット当たりの検査処理時間を短縮するウエハ検査装置を提供することを目的とする。

【0008】

【課題を解決する為の手段】 本発明は、前記目的を達成する為に、所定の間隔をもって配置された複数台のウエハ検査部と、検査対象のウエハが多数枚収納されたカセットを多数本ストック可能なカセットストック部と、カセットストック部の所定のカセットに収納された前記ウエハを、該カセットから1枚ずつ取り出して複数の前記ウエハ検査部にそれぞれ搬送すると共に、ウエハ検査部で検査終了したウエハを元のカセットまで搬送して該カセットに収納するウエハ搬送手段と、から成ることを特徴とする。

【0009】

【作用】 本発明によれば、まず、カセットストック部にストックされた複数本のカセットのうち、第1のカセットに収納された検査対象ウエハを、ウエハ搬送手段によって該カセットから1枚ずつ取り出して複数台のウエハ検査部にそれぞれ搬送する。次に、前記複数台のウエハ検査部で検査終了したウエハから順次に、前記ウエハ搬送手段によって元のカセットまで搬送して収納し、更に検査対象ウエハをカセットから取り出して検査終了したウエハ検査部に搬送する。

【0010】 これにより、1カセット当たりの検査処理時間をウエハ検査部の台数分だけ短縮することができる。例えば、ウエハ検査部を8台設置すれば、ウエハ検査部1台で1カセットを検査処理する従来のウエハ検査装置と比較して、検査処理時間を1/8に短縮できる。尚、前記第1のカセットに収納された全てのウエハの検査が終了すると、カセットストック部の第2のカセットに収納されたウエハの検査を開始する。そして、第1のカセットをカセットストック部から取り出して、検査対象ウエハが収納された新しいカセットと交換する。このように、ウエハの検査が終了したカセットから順番に、新しいカセットと交換して後工程に順次送る。

【0011】

【実施例】 以下添付図面に従って本発明に係るウエハ検査装置の好ましい実施例について詳説する。図1には、本発明に係るウエハ検査装置10の実施例を示す上面図が示され、このウエハ検査装置10はウエハ検査部12、カセットストック部14、ウエハ搬送装置16、及びコントローラ部18から構成される。

【0012】 【ウエハ検査部12】 ウエハ検査部12は、ウエハ搬送装置16の搬送レール20を挟んで一方側（図中上方向）に4台のウエハプローバ22A、22B、22C、22Dが、また他方側（図中下方向）に4台のウエハプローバ22E、22F、22G、22Hが

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所定の間隔で、且つ対向して並列に配置される。また、4台のテスト24A、24B、24C、24Dが、ウエハプローバ22A乃至22Hに1台に2台の割合で接続されている。

【0013】前記ウエハプローバ22Aは、第1のウエハ搬送部26、及びプローブステージ28等を備えている。ウエハ搬送部26は、前記ウエハ搬送装置16の後述する自走台車30で搬送されたウエハを供給部26aで受け取ると、前記プローブステージ28の下方に配設された図示しないテーブルまで搬送する。テーブルは、前記ウエハを吸着して素子検査時に、その素子配列に従ったX-Y方向の水平移動と、Z方向の上下移動を行うことができる。

【0014】また、プローブステージ28には、検査対象のウエハに対応した図示しないプローブカードが取り付けられており、このプローブカードに設けられたプローブニードルに前記電気素子回路の各電極パッドを当接させることによって、各電気素子回路の形成品質が前記テスト24Aによって順次検査判定される。検査終了したウエハは、前記第1のウエハ搬送部26によって供給部26aまで搬送される。ウエハが前記供給部26aに搬送されると、その搬送終了を示す信号が前記コントローラ部18に出力される。

【0015】ウエハプローバ22Aには、カセット収納部32が設けられる。このカセット収納部32には、検査対象のウエハが多数枚収納されたカセット34が取り付けられる。このウエハは、ウエハプローバ22Aに設けられた図示しない第2のウエハ搬送部によってカセット34から1枚ずつ取り出されて前記テーブルまで搬送される。

【0016】尚、ウエハプローバ22B乃至22Hの構成は、前述したウエハプローバ22Aの構成と同一なので、その説明は省略する。

【カセットストック部14】カセットストック部14は、検査対象のウエハが多数枚収納された4本のカセット36A、36B、36C、36Dが、図中奥行き方向に所定の間隔で配置される。これらのカセット36A乃至36Dは、カセットストック部14に設けられた図示しない昇降装置によって図中奥行き方向に昇降移動可能となっている。

【0017】尚、前記昇降装置は、前述したコントローラ部18によって駆動制御されている。

【ウエハ搬送装置16】ウエハ搬送装置16は、図中X方向に配設された搬送レール20と、この搬送レール20に対して直交する図中Y方向に配設された搬送レール38とを有しており、搬送レール20には自走台車30が、また搬送レール38には自走台車40がそれぞれ走行移動可能に配置されている。更に、自走台車40の近傍には、ウエハの中継用チャック41が配設されている。

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【0018】前記自走車台30は図2に示すように、車台本体42とロボット部44とから構成される。車台本体42は、搬送レール20に移動可能に取り付けられており、車台本体42に内設された正逆転可能な駆動モータに連結された車輪を回転させることにより、搬送レール20に沿って走行移動することができる。一方、前記ロボット部44は、チャッキング移送部46と吸着部48とから構成される。チャッキング移送部46は、前記車台本体42上に固着された駆動モータ50を有し、この駆動モータ50には移送治具52が連結されている。移送治具52は、駆動モータ52が駆動することによって図中矢印方向に移動しながら180度反転することができる。また、前記移送治具52にはウエハチャッキングアーム54が固着される。ウエハチャッキングアーム54は、ウエハ56を保持して前記吸着部48の受け渡しチャック58上に載置することができる。

【0019】前記受け渡しチャック58に載置されたウエハ56は、載置されると同時に受け渡しチャック58に吸着されて下降し、皿部60に安定して保持される。尚、前記自走車台40の構成は、前述した車台本体42とチャッキング移送部46とから成っているので、その説明は省略する。また、前記自走車台30、40の走行方向、走行距離、駆動モータ50、及び受け渡しチャック58の昇降移動は、前記コントローラ部18によって制御されている。

【0020】次に、前記の如く構成されたウエハ検査装置10のコントローラ部18による制御方法について説明する。まず、自走車台40を図1に示した位置に移動させる。次に、自走車台40のロボット部44と、カセット36Aの昇降装置を制御して、カセット36Aに収納された検査対象ウエハ56を、ウエハチャッキングアーム54でカセット36Aから1枚ずつ取り出し、移送治具52を180°回転させて中継用チャック41に載置する。

【0021】次に、自走車台30を図1中右端に移動させる。そして、自走車台30のロボット部44と吸着部48とを制御して、前記中継用チャック41に載置されたウエハ56を、自走車台30のウエハチャッキングアーム54で保持し、移送治具52を180°回転させて受け渡しチャック58に載置すると共に受け渡しチャック58で吸着し、受け渡しチャック58を下降させて皿部60に保持する。

【0022】次いで、自走車台30を図1中左方向に走行させて、ウエハプローバ22Aのウエハ搬送部26の位置で停止させる。そして、受け渡しチャック58を上昇させてウエハ56を皿部60から離脱させると共に、ウエハチャッキングアーム54でこのウエハ56を保持した後、移送治具52を時計回り方向に90°回転させて、ウエハ搬送部26の供給部26aに載置する。供給部26aに載置されたウエハ56は、ウエハ搬送部26

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でテーブルまで搬送されて検査される。

【0023】このようにして、残りのウエハプローバ22B乃至22Hについても、カセット36Aのウエハ56、56…をそれぞれ搬送し、各ウエハプローバ22B乃至22Hで検査を開始する。次に、前記ウエハプローバ22A乃至22Hのうち検査終了したウエハ56が、そのウエハプローバ22A乃至22Hの供給部26aまで搬送されると、検査終了したウエハ56から順番に、前記ウエハ搬送装置16によってカセット36Aまで搬送されて収納される。ウエハ搬送装置16によるウエハ

10 収納手順は、前述したウエハ搬送手順の逆工程なので、その説明は省略する。

【0024】そして、ウエハ56の搬送と収納を繰り返した後、カセット36Aの全てのウエハ56、56…の検査が終了すると、カセット36Bに収納されたウエハ56の検査を開始する。そして、カセット36Aをカセットストック部14から取り出して、検査対象ウエハが収納された新しいカセットと交換する。このように、ウエハの検査が終了したカセットから順番に、新しいカセットと交換して後工程に順次送る。

【0025】これにより、本実施例では、1カセット当たりの検査処理時間をウエハ検査部の台数分だけ短縮することができる。例えば、本実施例のように、ウエハプローバ22A乃至22Hを8台設置すれば、ウエハプローバ1台で1カセットを検査処理する従来のウエハ検査装置と比較して、検査処理時間を1/8に短縮できる。

【0026】尚、本実施例では、1品種のウエハ56の検査処理について説明したが、これに限られるのではなく、カセット36A乃至36D毎に品種の異なるウエハが収納されている場合には、ウエハプローバ22A乃至22Hをテスト4A乃至24D毎に分けてウエハの品種に対応するように設定すれば良い。また、ウエハ56の検査終了後、ウエハ搬送装置16から新しいウエハ56が搬送されてくるのに時間がかかる場合は、各ウエハプローバ22A乃至22Hに装着したカセット34が\*

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\*らウエハを取り出して検査するようにすれば良い。これにより、効率良くウエハの検査処理を行うことができる。

【0027】更に、各ウエハプローバ22A乃至22Hにウエハチャッキングアームを設け、このウエハチャッキングアームで受け渡しチャック58に吸着されたウエハ56をウエハプローバ22A乃至22Hに移送するようにしても良い。

【0028】

10 【発明の効果】以上説明したように本発明に係るウエハ検査装置によれば、カセットストック部にストックされた複数本のカセットのうち、所定のカセットに収納された検査対象ウエハを、ウエハ搬送手段によって該カセットから1枚ずつ取り出して複数台のウエハ検査部にそれぞれ搬送すると共に、複数台のウエハ検査部で検査終了したウエハから順番に元のカセットまで搬送して収納するようにした。これにより、ウエハ検査部1台で1カセットを検査処理する従来のウエハ検査装置と比較して、1カセット当たりの検査処理時間を大幅に短縮できる。

20 【図面の簡単な説明】

【図1】本発明に係るウエハ検査装置の実施例を示す上面図

【図2】本発明に係るウエハ検査装置に適用されたウエハ搬送台車の正面図

【符号の説明】

10…ウエハ検査装置

12…ウエハ検査部

14…カセットストック部

16…ウエハ搬送装置

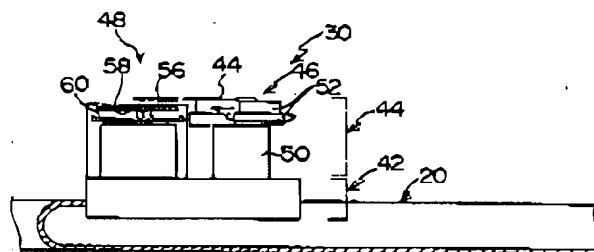
30 18…コントローラ部

22A、22B、22C、22D、22E、22F、22G、22H…ウエハプローバ

30、40…自走台車

36A、36B、36C、36D…カセット

【図2】



(5)

特開平5-343497

【図1】

